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REPORT OF

CLASS A FOAM TESTS

PREPARED BY

**UNDERWRITERS LABORATORIES INC.
PROJECT 93NK24320/and 93NK24320A/NC222**

FOR THE

**DEPARTMENT OF THE ARMY
BELVOIR RESEARCH, DEVELOPMENT AND
ENGINEERING CENTER**

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EXECUTIVE SUMMARY

Class A foams have been used to fight forest and brush fires for many years. The United States Department of Agriculture (USDA) investigates Class A foams with respect to their toxicity and environmental characteristics. There are no test methods or requirements specified in the National Fire Protection Association (NFPA) Standard for Foam Chemicals For Wildland Fire Control, NFPA 298, to evaluate the fire fighting effectiveness of these foams.

Under this research project, wood crib fire and exposure protection tests were conducted to evaluate the fire fighting effectiveness of Class A foam hand hoselines as compared to water only. Foam quality tests were also conducted as a part of the research project. These tests were conducted using six Class A foams on the Qualified Products List (QPL) published by the USDA, a UL Listed one percent aqueous film forming foam (AFFF) and water only. Due to the limited number of tests conducted under this investigation, the results were considered inconclusive with respect to quantifying the fire fighting effectiveness of Class A foams.

The wood crib fire tests were conducted using Class 20-A wood cribs described in the Standard for the Rating and Fire Testing of Fire Extinguishers ANSI/UL 711. These cribs were designed to be extinguished by a 33 gpm straight stream hoseline applying water only for one minute. For this series of tests, a hand held nozzle set to a straight stream position and fitted with an air aspirating attachment was used at a flow rate of 15 gpm. Class A foam solution concentrations of 0.5 or 1.0 percent were used for all of the tests except those with water only. Except for one of the Class A foam solutions, the results of the wood crib fire tests demonstrated the ability of the Class A foam solutions to extinguish the Class 20-A wood crib. During baseline tests conducted with water only at 15 gpm, the Class 20-A wood crib was not extinguished at the end of the 60 second discharge.

Exposure protection tests were conducted using water only and a Class A foam solution concentration of 0.5 percent. All of the tests were conducted using a hand held air-aspirated nozzle at a flowrate of 1 gpm.

4.0 DISCUSSION AND RECOMMENDATIONS

DISCUSSION:

GENERAL

Due to the limited number of tests conducted under this investigation, the results were considered inconclusive with respect to quantifying the fire fighting effectiveness of Class A foams. However, the limited tests did demonstrate the ability of hand hoselines supplied with Class A foam solutions to provide enhanced fire fighting performance compared to hand hoselines supplied with water.

WOOD CRIB FIRE TESTS

The results of the wood crib fire tests demonstrated the ability of the Class A foam solutions to reduce the time required to control the fire as compared to water only. During the fire tests conducted with water only, neither wood crib was extinguished as evidenced by visible flaming at the end of the 60 second water application. Fire tests conducted at a 1.0 percent Class A foam solution concentration had the longest reignition times.

EXPOSURE PROTECTION

The results of the exposure protection tests demonstrated the ability of the Class A foam solutions to lengthen the ignition time of a combustible surface as compared to water only at a heat flux value of 50 kW/m². Except for Foam G, the average ignition times of the wood cribs exposed to the Class A foams were as much as 50 percent longer as compared to those exposed to water only at the 50 kW/m² heat flux value.

RECOMMENDATIONS:

Additional research should be undertaken to develop appropriate test procedures and requirements to establish an acceptable level of fire fighting performance for Class A foams. Class A foam test requirements contained in NFPA 298 and those developed by the USDA address environmental characteristics only.

There is a need to establish minimum performance criteria for Class A foams to provide a means for evaluating their ability to (1) suppress or control fires, (2) retard the ignition of combustible surfaces exposed to high levels of heat flux and (3) adhere to or be absorbed into both horizontal and vertical surfaces of combustible materials.

The effects of bubble size and generation method would also appear to impact the efficiency of Class A foams which would need to be further researched.